

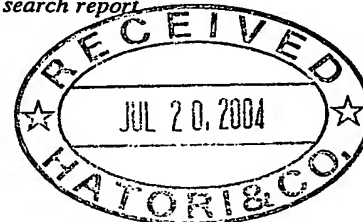
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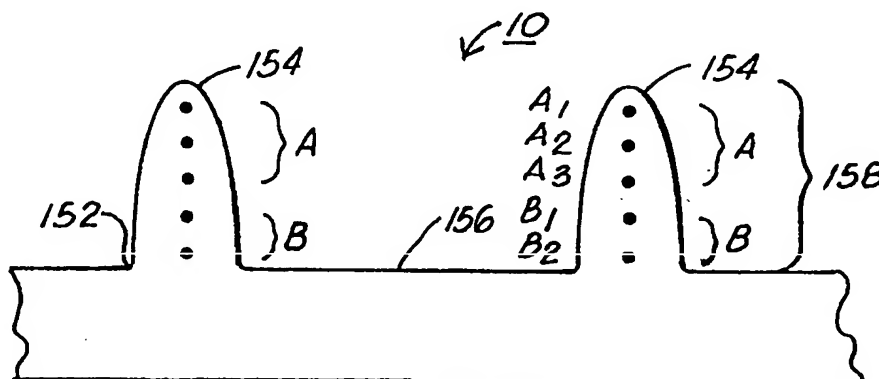
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(54) Title: DISPOSABLE ABSORBENT ARTICLES WITH IMPROVED LIQUID ABSORPTION AND RETENTION

(57) Abstract

An absorbent disposable garment (10) such as a diaper, incontinence pant, or a training pant, having a unitary cuff (34) is disclosed. The construction of the unitary cuff (34) provides improved comfort to the wearer's leg in the cuff area, a tighter seal around the leg to prevent leakage, and achieves these results utilizing simpler manufacturing processes. The unitary cuff (34) does not require an additional separate leg gasket cuff. The unitary cuff has a proximal edge (152) attached to or extending from the disposable garment (10); an edge (154) distal from the disposable garment; and exhibits elasticity along a width between the distal edge (154) and proximal edge (152). The elasticity (B), nearer the proximal edge (152) has a higher contractile force than the elasticity (A) near the distal edge (154) (i.e., near the wearer's leg) of the unitary cuff.



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## DISPOSABLE ABSORBENT ARTICLES WITH IMPROVED LIQUID ABSORPTION AND RETENTION

### BACKGROUND OF THE INVENTION

#### FIELD OF THE INVENTION

The present invention relates to disposable absorbent articles and, more particularly, to a disposable absorbent garment, such as a diaper, a training pant, an incontinence pant, or a disposable feminine hygiene product, having an improved unitary cuff.

#### DESCRIPTION OF THE RELATED ART

Disposable absorbent articles are increasingly popular products in today's world. Disposable diapers and training pants usage far exceeds that of cloth diapers; disposable feminine hygiene products offer improved comfort and utility to the wearer; and disposable incontinence products offer adults control and absorption of the involuntary bowel and bladder discharge associated with many medical conditions, especially those conditions associated with advancing years.

One of the biggest problems associated with the above-described disposable articles is leakage and, consequently, many designs have been developed in an effort to comfortably minimize the leakage problem. Some prior art disposable diapers such as U.S. Patent No. 4,704,116 to Enloe and U.S. Patent No. 4,695,278 to Lawson, have standing inner barrier cuffs, combined with elastic leg gathers. The barrier cuffs and elastic leg gathers work together to retain waste.

The foregoing prior art barrier cuff/elastic gather combinations are effective to varying degrees in containing discharge from a wearer's body. However, the designs are generally complex and require multiple steps in fabrication, resulting in

undesirable expense and inefficiency. For example, cuff/elastic gather combinations require the creation of both a cuff and an elastic gather, which must be applied and engineered to work together. Hence, there is a need for a disposable garment that is constructed to prevent leakage, which can be efficiently produced.

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United States Patent No. 5,643,243 (the "'243 Patent") describes a design that addresses the foregoing problems. The patent discloses a disposable garment that includes a topsheet, a backsheet, an absorptive core disposed between the topsheet and backsheet, and an elasticized unitary cuff. The unitary cuff has an edge proximal and attached to or extending from the body of the disposable garment and an edge distal from the body of the disposable garment. The distal edge is positioned to contact the crotch area of a wearer of the disposable garment. The unitary cuff exhibits longitudinal elastication along a width between the distal and proximal edges. The elastication may assume a variety of structures. For example, it can include multiple strands of elastic material or a single width of elastic material. The width of elastication may be substantially the distance between the distal edge and the proximal edge while successful, it has been discovered that the unitary cuff of the '243 Patent may be improved to provide a more secure construction and improved wearer comfort.

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### **SUMMARY OF THE INVENTION**

It is, therefore, an object of the present invention to provide an absorbent disposable article having an improved unitary cuff.

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Another object of the present invention is to provide an improved unitary cuff wherein the elastic forces may be varied in order to provide a secure fit while maintaining the wearer's comfort.

According to another object of the invention, there is provided an improved unitary cuff in which the placement of the proximal elastics is in close proximity to the body of the article.

5 Another object of the present invention is to provide an improved unitary cuff that provides improved leakage resistance. Particularly, the cuffs should create a seal against the wearer's body so that liquid and solid waste does not leak from the regions between the cuffs and the wearer's body.

10 Yet another object of the present invention is to provide an improved unitary cuff wherein the spacing between the elastics in the cuff varies to provide improved fit and comfort.

15 Therefore, in accordance with one aspect of the present invention, there is provided a disposable absorbent article with (1) a body that includes a topsheet, a backsheet, and an absorptive core located between and attached to the topsheet or backsheet, and (2) an elasticized unitary cuff. The unitary cuff has an edge proximal to the body and an edge distal from the body. The unitary cuff exhibits longitudinal elastics at least along the crotch region of the cuff, wherein the elastics vary along the width of the cuff. The distance between the proximal edge and the distal edge will be referred to as the width of the cuff. Preferably, the elasticized unitary cuff exhibits greater elastics force near the proximal edge. In a further preferred embodiment, the elastics is provided to the unitary cuff by positioning a plurality of strands of elastic material along the width of the cuff. The strands closer to the proximal edge of the cuff are subjected to greater tension than the strands closer to the distal edge.

25 In accordance with another aspect of the present invention, there is provided a disposable absorbent article having (1) a body that includes a topsheet, a backsheet, and an absorptive core located between the topsheet or backsheet, and (2) a cuff

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having a first edge proximal to the body and a second edge distal from the body. The cuff exhibits elastication forces, at least in its proximal and distal regions. Preferably, the proximal elastication is greater than the distal elastication.

5 In accordance with yet another aspect of the present invention, there is provided a disposable absorbent article having (1) a body that includes a topsheet, a backsheet, and an absorptive core located between the topsheet or backsheet, and (2) a cuff having a first edge proximal to the body and a second edge distal from the body. The cuff exhibits elastication at least in its proximal and distal regions and the  
10 proximal elastication is in close proximity to the article body.

In accordance with still yet another aspect of the present invention, there is provided a disposable absorbent article having (1) a body that includes a topsheet, a backsheet, and an absorptive core located between the topsheet or backsheet, and (2)  
15 a cuff having a first edge proximal to the body and a second edge distal from the body. The elastication comprises a plurality of elastic strands positioned such that the distance between the strands in the proximal region of the cuff is less than the distance between the strands in the distal region of the cuff.

20 Advantageously, the present invention provides a barrier cuff that is constructed in a way that provides all elasticating material formerly provided in the two separate structures of the leg gasketing cuff and the upstanding barrier cuff in the current, improved elasticized unitary cuff. The improved cuff provides a contractile force strong enough to provide a seal around the wearer's leg, buttocks or both. In  
25 addition, the area from which the force is generated may be varied either in strength or position to provide a form fit of the diaper.

Other and further objects, features, and advantages of the present invention will be apparent from the following description of presently preferred embodiments

of the invention, given for the purpose of disclosure, and taken in conjunction with the accompanying drawings.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

5           **Fig. 1** shows a top view of a conventional disposable article.

**Fig. 2** shows a perspective view of a conventional disposable article.

**Fig. 3** shows an exploded view of the disposable article of Fig. 2.

10           **Fig. 4** shows a cross-sectional view of the disposable article taken along line 4-4 of Fig. 2.

15           **Fig. 5** shows a cross-sectional view of a disposable article according to the present invention.

**Fig. 6** shows a cross-sectional view of a disposable article according to the present invention.

### **DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS**

20           The present invention can be implemented in any disposable article, such as a disposable diaper, a training pant, an incontinence product or a feminine hygiene product. For purposes of description, the following discussion will be directed to a disposable diaper. It is understood, however, that the discussion is equally applicable  
25           to any other disposable article.

30           A disposable absorbent diaper should provide a variety of features. A principal feature is that it should possess a means for effecting a seal about the wearer. The seal advantageously goes around the waist and the legs so that the article fits snugly, but more importantly, so that liquid and solid waste does not leak past the seal. The

seal may be implemented with the aid of elastic members. The article generally also possesses a means for securing the article to the wearer that is easy to engage/disengage. Also the article generally includes an element that absorbs the liquid. Finally, the shape of the article, i.e., the profile, should enhance the overall goal of absorbing liquid and retaining it within the article by channeling the liquid to inhibit local saturation of the core, and by facilitating the seal around the wearer. These features, either individually or in combination, are designed to accomplish one or more of three purposes: (1) absorbing liquid; (2) preventing liquid and solid waste from escaping the article, either through the article material, or through the gaps between the article edges and the wearer; and/or (3) dispersing the liquid about the article and delivering it to the core material.

Figs. 1 and 2 illustrate some basic features of a disposable diaper 10. Referring first to Fig. 1, the diaper will be described in relation to its longitudinally extending central axis A and its laterally extending central axis B. The diaper includes three main regions aligned along the longitudinal axis A. These regions are the front waist region 12, the back waist region 14, and the crotch region 16. In the lateral direction, the diaper includes ear regions 18 and body portion 20. More particularly, the diaper 10 has two ears 22 located along the front waist region 12, and two ears 24 along the back waist region 14. As illustrated in the drawings, the resulting diaper has an hourglass shape, with the crotch region 16 fitting about the crotch of the wearer; the front and back waist regions, 12 and 14, respectively, fitting about the corresponding waist areas of the wearer; and the ear regions 18 wrapping about the wearer to form the completed waist of the diaper. A fastening structure 26, for example, a tape fastener, is affixed to each of the ears 24 along the back waist region 14 of the diaper 10. The fasteners 26 adhere to a fastening surface on the corresponding ear 22 to secure the diaper to the wearer. Particularly, after the diaper is positioned on the wearer, the ears 24 along the back waist region 14 are brought around the wearer's waist and toward the wearer's front and into alignment with the ears 22 along the front waist region 12. The fasteners 26 are then secured to the front



ears. The corresponding securing surface on the front waist region 12 may be located on the interior or exterior surface of the diaper 10. Furthermore, the fasteners 26 can be located on the ears 22 of the front waist region 12 and attached to the ears of the back waist region 14; however, this latter construction is currently not preferred since it is more inconvenient to change a diaper having this construction. It is understood that fastening means, other than tape, may be used; for example, a hook and loop structure in which a tab having hook structures is attached to the back waist ears and, when placed on the wearer, is secured to loop members along the front waist region.

The diaper 10 additionally may have two transverse elastic waist members 28 and 30 located at each end of the diaper, roughly between the respective ears. When the diaper 10 is properly placed on the wearer, the elastic waist members 28 and 30 form the "top" of the article—i.e., the uppermost part. The elastic waist members 28 and 30 have essentially two functions. The first of these functions is to secure the diaper 10 snugly around the waist of the wearer so that it does not slip during wear—i.e., it forms an elastic waistband once the diaper 10 is placed on the wearer. The second function, related to the first, is to form a seal around the wearer's waist so that waste produced by the wearer does not leak out of the top of the diaper 10.

Figs. 1 and 2 also show longitudinally stretchable elastic gasketing cuffs 32 positioned along the two longitudinal edges of the diaper 10. When the diaper 10 is properly affixed to the wearer, each gasketing cuff 32 encircles a leg of the wearer and thereby provides a seal to prevent leakage laterally from the interior of the diaper. The elastics of the leg gasketing cuffs 32 are generally applied in the stretched or extended condition. In a common application, the elastics are placed between the topsheet and backsheet in the stretched condition and glued or otherwise attached to one or both of the sheets. The elastics are then released to allow them to retract and form gathered leg regions depicted in Fig. 2 at 36.

The figures, and particularly Fig. 3, also illustrate the presence of longitudinally extending upstanding barrier cuffs 34. The barrier cuffs 34 extend upwardly from the topsheet 50, i.e., toward the wearer, and are positioned laterally in both directions from the longitudinally extending central axis A (see Fig. 1). The barrier cuffs 34 extend longitudinally along the diaper 10 at least in the crotch region 16. The barrier cuffs 34 include elastic members 38 that act to contract the barrier cuffs 34 about the buttocks of the wearer. The barrier cuffs 34 may be positioned at a variety of distances from the longitudinal centerline A of the diaper 10. For example, the barrier cuffs 34 may be inboard or outboard of the gasketing cuffs 32. The barrier cuffs 34 may comprise separate pieces that are secured, e.g., by gluing, to the topsheet 50. In addition, the barrier cuffs 34 may be formed from the topsheet 50 or backsheet 40.

Fig. 4 shows a cross-sectional view of the diaper 10 taken along line 4-4 of Fig. 2. Fig. 4 illustrates the various layers of the diaper. Referring to Fig. 4, as well as Fig. 3, and beginning with the layer positioned farthest from the wearer, the diaper 10 is comprised of a backsheet 40, barrier layer 42, a bottom tissue layer 44, an absorbent core 46, another tissue layer 48, and a topsheet 50. Many conventional diapers may include more or less layers, though the state-of-the-art diapers generally consist of at least a backsheet, a topsheet and some type of absorbent core between these two layers.

Adjoined to either transverse end of the barrier layer 42 are two foam stretch waist bands 52 that form, in concert with at least the topsheet 50 and backsheet 40, the elastic waist members 28 and 30. As previously mentioned, the elastic waist members 28 and 30 partially encircle the waist of the wearer. Two tape fasteners 26 are also affixed to the backsheet 40.

Against this general background, the previously mentioned '243 Patent describes an advancement to the traditional diapers described above and illustrated in Figs. 1-4. The '243 Patent describes a unique structure in which the gasketing leg cuff elastics and the barrier cuff elastics are combined into a unitary upstanding barrier cuff. The resulting invention provides advantageous sealing against leakage, while avoiding the increased cost and processing difficulties of providing a separate barrier cuff and gasketing leg cuff elastics.

While the '243 Patent has proved successful, it has been discovered that the design may be improved by adjusting the positioning, tensioning or both of the elastics of the unitary barrier cuff. Particularly, it has been discovered that the elastics nearer the proximal edge (referred to also as the proximal elastic or the elastic in the proximal region of the cuff) should exhibit greater tensioning than the elastics nearer the distal edge (referred to also as the distal elastic or the elastic in the distal region of the cuff). This difference in elastics can be achieved by a variety of ways, including utilizing proximal elastic which has a higher contractile force than the distal elastic or positioning the proximal elastics closer together than the distal elastics. Varying the tensioning provides a unitary cuff which has a firm elastics force at the proximal edge that helps to position the cuff away from the main body of the article and curls the body of the garment around the wearer, while lower elastics forces located at the distal edge provide greater flexibility to the unitary cuff and comfort to the wearer where the garment contacts the skin. In a preferred embodiment, a diaper according to the present invention includes elastic, for example, multiple elastic strands or a single width of elastic, in which the contractile force of the elastics closest to the proximal edge is about 10 to 50 percent greater than that at the distal edge. Most preferably, the contractile force of the proximal elastic is about 25% of the distal contractile force.

In an alternative embodiment, the elastics of the cuff comprises a series of elastics in which the proximal elastics are more closely spaced together than are the

distal elastics. Preferably, the distance between the proximal elastics is equal to or less than about 50% of the distance between the distal elastics. Of course, both approaches of increasing proximal tensioning may be utilized in a diaper.

5 Furthermore, it is preferred that the proximal elastication be positioned in close proximity to the proximal edge of the cuff. Preferably, the most proximal elastication in the cuff is positioned at a distance from the body that is less than or equal to about 15% of the total cuff width. For example, in one embodiment in which the cuff is approximately 25 mm wide, the elastic closest to the body is positioned about 3 mm  
10 from the body. Likewise, the most distal elastication in the cuff should be positioned close to the distal cuff edge, preferably, also less than or equal to about 15% of the total cuff width and, most preferably, less than or equal to about 10% of the total cuff width. For example, for a cuff of about 25 mm, it is preferred that the elastication be within 3mm of the distal edge and, most preferably, within 2mm or less of the distal  
15 edge of the unitary cuff.

The unitary cuffs may be positioned laterally at various positions from the centerline of the diaper to the lateral edges of the envelope. Preferably, the cuffs are positioned outboard of the absorbent core and, most preferably, are positioned near  
20 the longitudinal edges of the diaper so that the distance between the cuffs is at least 85% of the width of the total article within the crotch region. In an example, the unitary cuffs are centered on the disposable garment crotch region and positioned 85mm from the longitudinal center (A) of the diaper (i.e., 170mm between the cuffs). A preferred total width of the disposable garment at the crotch region is 200mm.

25 In one preferred embodiment and referring to Figs. 5 and 6, the unitary cuff is constructed using five strands of elastic material (A, B), which are spaced from one another generally along the width of the cuff between the distal edge and the proximal edge (Fig. 5). The strands (B) are two strands of 940 decitex Lycra XA  
30 elastic threads made by the DuPont Company with a higher contractile force than

strands (A). Strands (A) may be three strands of 740 decitex Lycra XA elastic threads, a lower contractile force than the 940 deciter Lycra XA elastic threads. The strands are generally evenly spaced along the width of the unitary cuff.

5           **Fig. 6** shows another preferred embodiment wherein the elastic region of the unitary cuff has elastic bands with the same elastication force and the spacing between the elastic strands is varied. As **Fig. 6** illustrates, the proximal elastics **B** are positioned closer together than are the distal elastics **A**. In one embodiment, the distance between the proximal elastics is equal to or less than one-half the distance between the  
10           distal elastics. In yet another design (not shown), the unitary cuff may have proximal elastics that have contractile forces that are greater than the distal elastics and that are spaced closer together than the distal elastics.

15           The unitary cuff may be easily formed and manufactured utilizing know methodologies and equipment, including the technique taught by U.S. Patent No. 5,536,350. The unitary cuffs may be formed integrally from the topsheet or backsheet material, or may be formed of separate materials, which may or may not be used to form the remainder of the distal flaps of the article. The unitary cuffs may extend along the length of the article, or only may extend along the crotch zone of the article.  
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            The remaining discussion describes, in more detail the various layers and structures that comprise the diaper of **Figs. 1-4**.

### **Backsheet**

25           The backsheet material can be selected from a number of different materials such as polyethylene, polypropylene, polyolefin film, or other materials. Preferably, the backsheet material allows air to circulate through. This attribute is generally referred to as "breathable," or "vapor" permeable, to distinguish it from liquid permeable. The backsheet can also be made of a liquid permeable, nonwoven web,  
30           laminated to a film barrier layer underneath. The barrier layer may or may not be

vapor permeable, and it may be a "mask" that is less than the overall width of the other backsheet materials. A preferred backsheet material is an outer layer of spunbond polypropylene fiber with a basis weight of about 15 gsm, available from BBA Nonwovens, Simpsonville, SC. Adhesively laminated to the spunbond is, preferably, a polyethylene film of about 0.5 mil (0.012mm) thickness that is available from Exxon Chemical USA, Houston, TX, using adhesive available from National Starch and Chemical Company, Bridgewater, NJ. Other examples of backsheet material include SM or SMS (spunbond/meltblown/spunbond) nonwoven webs, and breathable or nonbreathable films of 0.5 mil to 2.0 mils in thickness.

### Topsheet

Topsheets may be constructed of a wide range of materials including nonwoven webs of natural (such as wood or cotton) or synthetic fibers (such as polypropylene or polyester), or some combination, or apertured film. A preferred topsheet material is 15 gsm spunbond polypropylene from Avgol Nonwoven Fabrics of Holon, Israel. The topsheet may be impregnated with surfactant to facilitate liquid transfer. The surfactant may be targeted, such as in the center zone of the disposable article, above the core material. The inner surface of the topsheet may be impregnated with a chemical to increase surface tension of the liquid. The topsheet may be formed of multiple materials which vary across the width of the topsheet, thus allowing the creation of preferred properties in different zones of the topsheet. For instance, a topsheet may be constructed of a three piece material which may be used to form cuffs from a hydrophobic end material and a center zone of hydrophilic material.

### Core

The core is formed of highly absorbent material for absorbing fluid received through the topsheet. The core has an inner surface, in fluid communication with the topsheet, an outer surface, and two lateral side surfaces. In this application, the term "core" (shown as the superabsorbent and fluff pulp core layer 46 in Fig. 3) shall be used to refer generally to that layer between the topsheet 50 and the backsheet 40,

placed directly between a top tissue layer 48 and a bottom tissue layer 44, and to which the absorbent property of the article is generally attributable. The two tissue layers 48 and 44 encapsulate the core and may be joined to form a pocket, e.g., by heat fusion, sonic bonding, or adhesives. The core material generally comprises a rectangular region of the diaper 10 viewed from the perspective as in Fig. 2, which, when the article 10 is placed on the wearer, is juxtaposed between the wearer's legs, against the crotch area in the area most likely to receive waste.

The most desirable characteristics of the core material are that it absorb large quantities of liquid, that it absorb quickly, and that it be as thin as possible. Attempts to satisfy these constraints have led to numerous core compositions. In addition, the structural configuration of the core is also manipulated to enhance absorbency, e.g., channels or grooves can be created to optimally disperse the liquid waste.

Many core compositions in the prior art are comprised of two components: a fluffed wood pulp component, for wicking and structural integrity, and a high-absorbency (or superabsorbent) material, for containing liquids. As expected, the majority of the volume of the article (i.e., its "bulkiness") is due to the fluff component. The fluffed wood pulp layer may be a composite material; e.g., an airlaid sheet bound by adhesive or containing thermally bondable fibers that are melted to add additional integrity to the structure. The high-absorbency material can be comprised of numerous compounds. A selection of suitable materials includes inorganic materials, such as polyvinyl alcohol, polyacrylates, various grafted starches, and cross-linked polysodium acrylate. Further, the high-absorbency materials can be manufactured and utilized in the diaper, etc., in numerous forms such as particles, fibers, foams, and layers.

The two-component system is necessary because many of the superabsorbent materials are unable to absorb liquid at, or even near, the rate at which it is applied by the article. Therefore, an additional material, the wood pulp core or composite, holds

the liquid and delivers it to the superabsorbent material, to absorb at a rate slower than the initial assault from the wearer, and to allow the superabsorbent material to fully absorb the liquid. In addition, the fibers prevent "gel-blocking" which may occur as the superabsorbent particles swell upon absorption of liquid and block the interstitial spaces between particles, thus cutting off channels for the liquid to flow and encounter with unsaturated particles. The fibers prevent gel-blocking by dispersing the particles, thus minimizing the potential for particle-to-particle contact. Several patents in the prior art are specifically directed to composites which curtail gel-blocking, such as U.S. Patent No. 5,147,343. Hence, achieving optimal absorbency (measured both as capacity and rate) involves not only identifying the suitable material which comprise the two components, but identifying the optimal ratio of the two components.

#### **Acquisition Layer**

The article may contain an additional layer between the top tissue layer 48 and the topsheet 50. This additional layer is called an acquisition layer or surge layer. The acquisition layer acts to spread out the liquid flow so that the liquid is distributed more evenly over the core surface. This feature serves to slow down the flow so that the liquid has time to be absorbed by the core. The layer also serves to prevent the core from being saturated in a localized region, while the remainder of the core is not absorbing any liquid.

#### **Securing Elements**

The article must be secured to the wearer. This is most important with respect to diapers since they are not pulled upon the wearer, like training pants, or incontinent briefs, but are fastened around the wearer. The securing elements compliment the elastic members by effecting a seal between the wearer and the waist band and leg cuffs, so that liquid is contained within the article and then absorbed; in other words, so that the liquid does not leak through gaps between the wearer's legs and the edge of the article. The securing elements may be adhesive, hook and loop belts, or,



conceivably, straps or strings-i.e., anything that will secure one end of the article to the longitudinally opposite end.

According to **Figs. 1, 3 and 4** above, the diaper **10** is affixed to the wearer by tape fasteners **26** adhesively affixed to the backsheet **40**. The tape fasteners **26** are contacted with the transversely opposite ear **22** extending from the backsheet **40**, where they remain affixed due to an adhesive compound applied to the fasteners **26**. A target area may be provided to cooperate with the fastener elements to secure the back of the diaper to the front. The target area will have characteristics appropriate to the type of fastener used. For example, if the fastener is a hook type fastener, the target will have appropriate loop characteristics. If the fastener is an adhesive, the target will have a surface to which the adhesive will adhere.

#### Waist Elastics

Waist elastics **28** and **30** (see **Fig. 1**) are elastic members that may be positioned along the transverse portion of the article so that when worn, they are located along the waist of the wearer. Generally speaking, the waist elastics of the article preferably satisfy two criteria. First, they must create a seal against the waist so that liquid waste does not leak from the regions between the waist elastics and waist of the wearer. This seal is significant because, although the liquid may eventually be absorbed by the core material, the assault of liquid by the wearer may overwhelm the absorption rate capacity of the core material, hence the waist elastics must contain the liquid while it is being absorbed. The waist elastic may be constructed as an integral part of the diaper as shown. It may also be attached to, or in place of, the outboard ear of the diaper, as a separate feature.

### Shape

Manipulating the shape of the article can accomplish several things. First, a more precise contour around the wearer's crotch area can prevent the article from bunching up, creating pools of liquid which will, in turn, locally saturate the underlying core material. Second, the shape can be manipulated to control the seal, or the closure of gaps between the edges of the article and the wearer. Hence, a narrower profile may be preferable to achieve a smooth liquid contact zone against the wearer's crotch (i.e., no bunching); however, a narrower profile means less surface area available for core material, hence less total absorption. Similarly, a larger profile, while more costly, can more readily accommodate a variety of sized wearers, whereas a narrower profile is unsatisfactory for larger-than-normal wearers.

The present invention, therefore, is well-adapted to carry out the objects and attain the ends and advantages mentioned, as well as others inherent therein. While presently, preferred embodiments of the invention have been given for the purpose of disclosure, numerous changes in the details of construction, arrangement of parts, and steps of the process may be made. These changes will readily suggest themselves to those skilled in the art and are encompassed within the spirit of the invention and the scope of the appended claims.

**WE CLAIM:**

1. A disposable absorbent article, comprising:
  - (a) a body that includes:
    - (i.) a topsheet;
    - (ii.) a backsheet; and
    - (iii.) an absorptive core located between said topsheet or backsheet; and
  - (b) an elastic unitary cuff:
    - (i.) having an edge proximal said body;
    - (ii.) having an edge distal from said body;
    - (iii.) exhibiting longitudinal elastics along substantially the width of said cuff, wherein said elastic unitary cuff exhibits zones of different elastics.
2. An absorbent article according to claim 1, wherein said elastic unitary cuff exhibits greater elastics force near said proximal edge.
3. A disposable absorbent article according to claim 1, wherein said elastics comprises multiple strands of elastic material.
4. An absorbent article according to claim 3, wherein said elastic unitary cuff exhibits greater elastics force near said proximal edge.
5. The disposable garment of claim 1, wherein said elastic unitary cuff is formed from said topsheet.
6. The disposable garment of claim 1, wherein said elastic unitary cuff is formed from said backsheet.

1           7.     A disposable absorbent article comprising:

2               (a)     a body that includes:

3                   (i.)     a topsheet;

4                   (ii.)    a backsheet; and

5                   (iii.)   an absorptive core located between said topsheet or backsheet;  
6                   and

7               (b)     a cuff having a first edge proximal to said body and a second edge  
8                   distal from said body and exhibiting elastics between said distal  
9                   edge and said proximal edge, wherein the elastics force is different  
10                  in the distal area of said cuff than in the proximal area of said cuff.

1           8.     A disposable absorbent article, comprising:

2               (a)     a body that includes

3                   (i.)     a topsheet;

4                   (ii.)    a backsheet, and

5                   (iii.)   an absorptive core located between said topsheet or backsheet;  
6                   and

7               (b)     an elastic unitary cuff,

8                   (i.)     having an edge proximal said body,

9                   (ii.)    having an edge distal from said body, and

10                  (iii.)   exhibiting elastics at least in the proximal and distal regions  
11                  and said proximal elastics is in close proximity to said body.

1           9.     A disposable absorbent article, comprising:

2               (a)     a body that includes

3                   (i.)     a topsheet;

4                   (ii.)    a backsheet, and

5                   (iii.)   an absorptive core located between said topsheet or backsheet;  
6                   and

- 1 (b) an elastic unitary cuff,  
2 (i.) having an edge proximal said body,  
3 (ii.) having an edge distal from said body, and  
4 (iii.) including multiple elastics, wherein at least certain of said  
5 elastics are near said proximal edge and at least certain of said elastics  
6 are near said distal edge and said elastics that are near said proximal  
7 edge are spaced closer together than said elastics near said distal edge.

- 1 10. A disposable absorbent article as claimed in Claim 9, wherein the distal  
2 between said proximal elastics is less than or equal to the 50% of the distance  
3 between said distal elastics.

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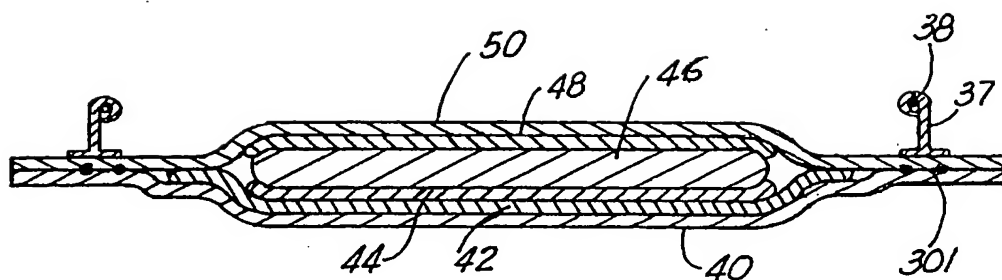


FIG. 4

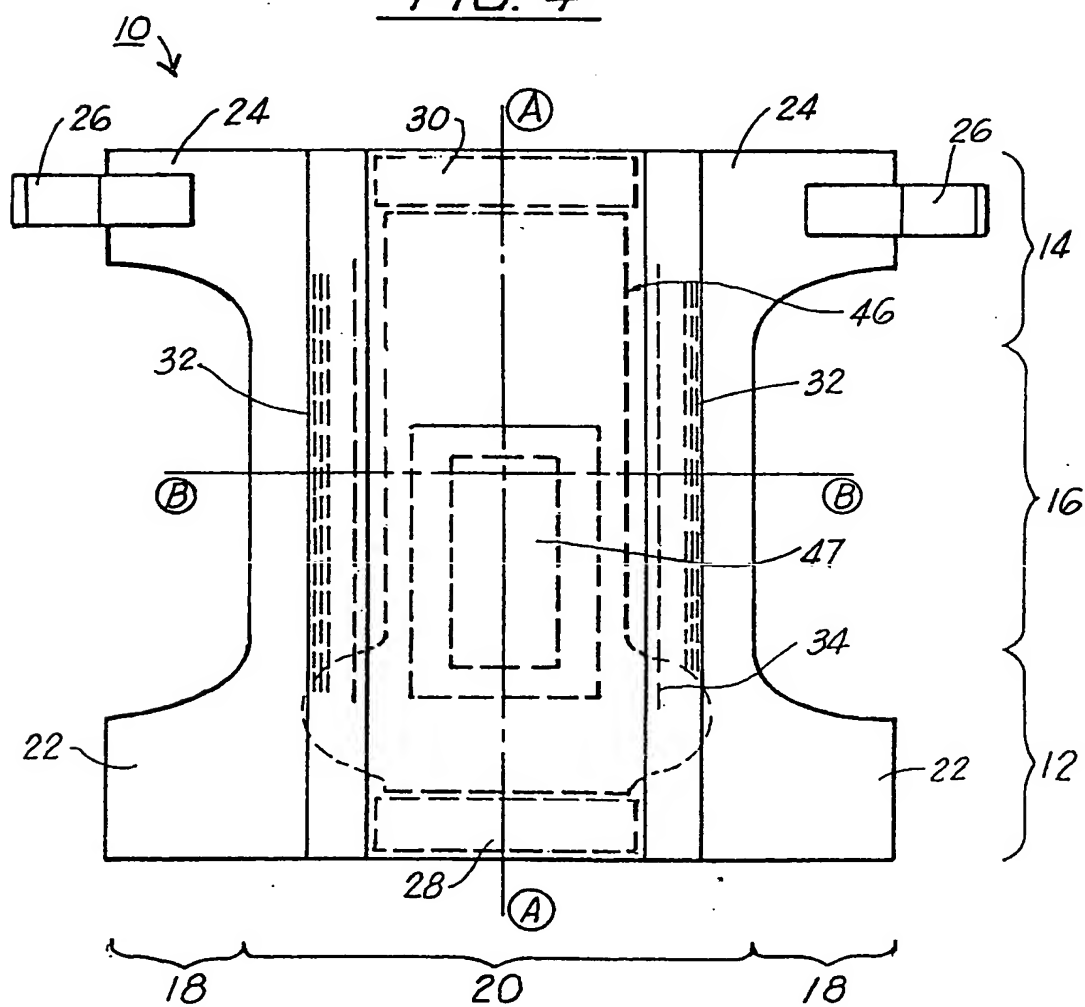
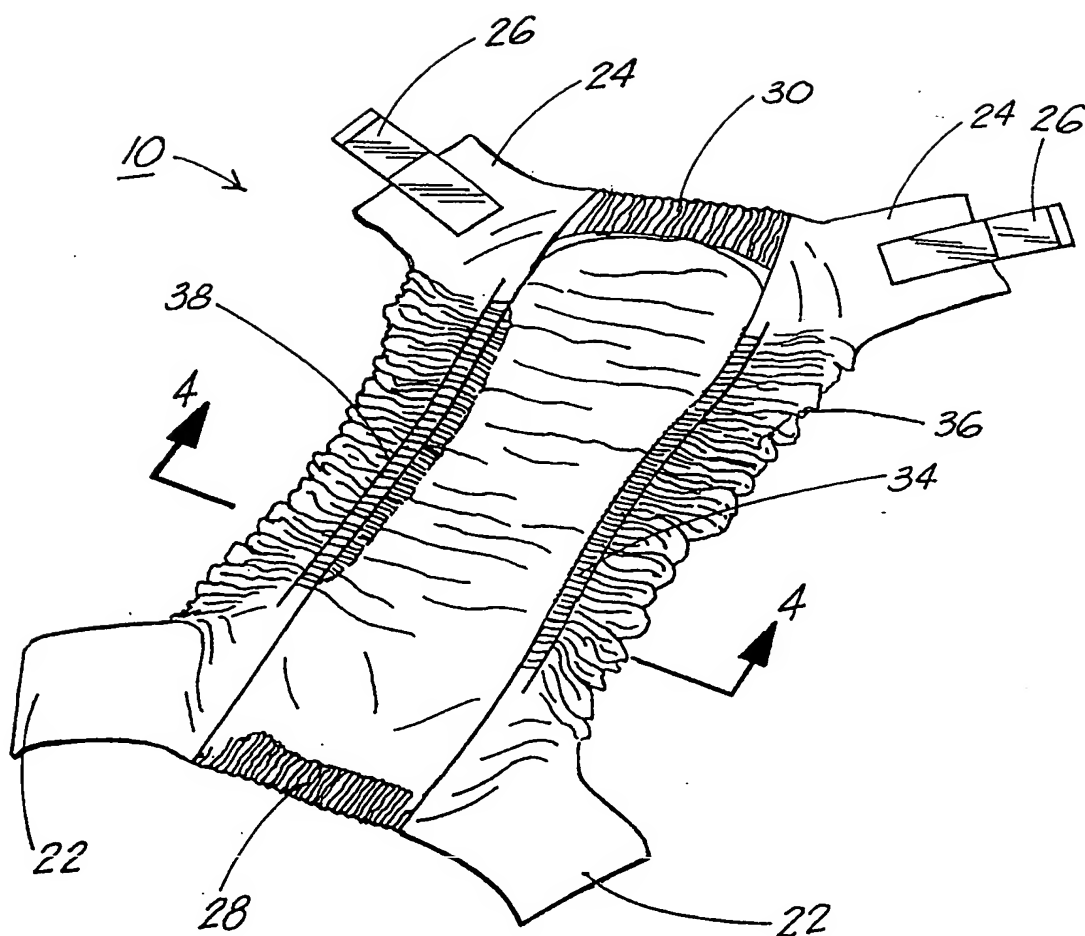


FIG. 1

FIG. 2

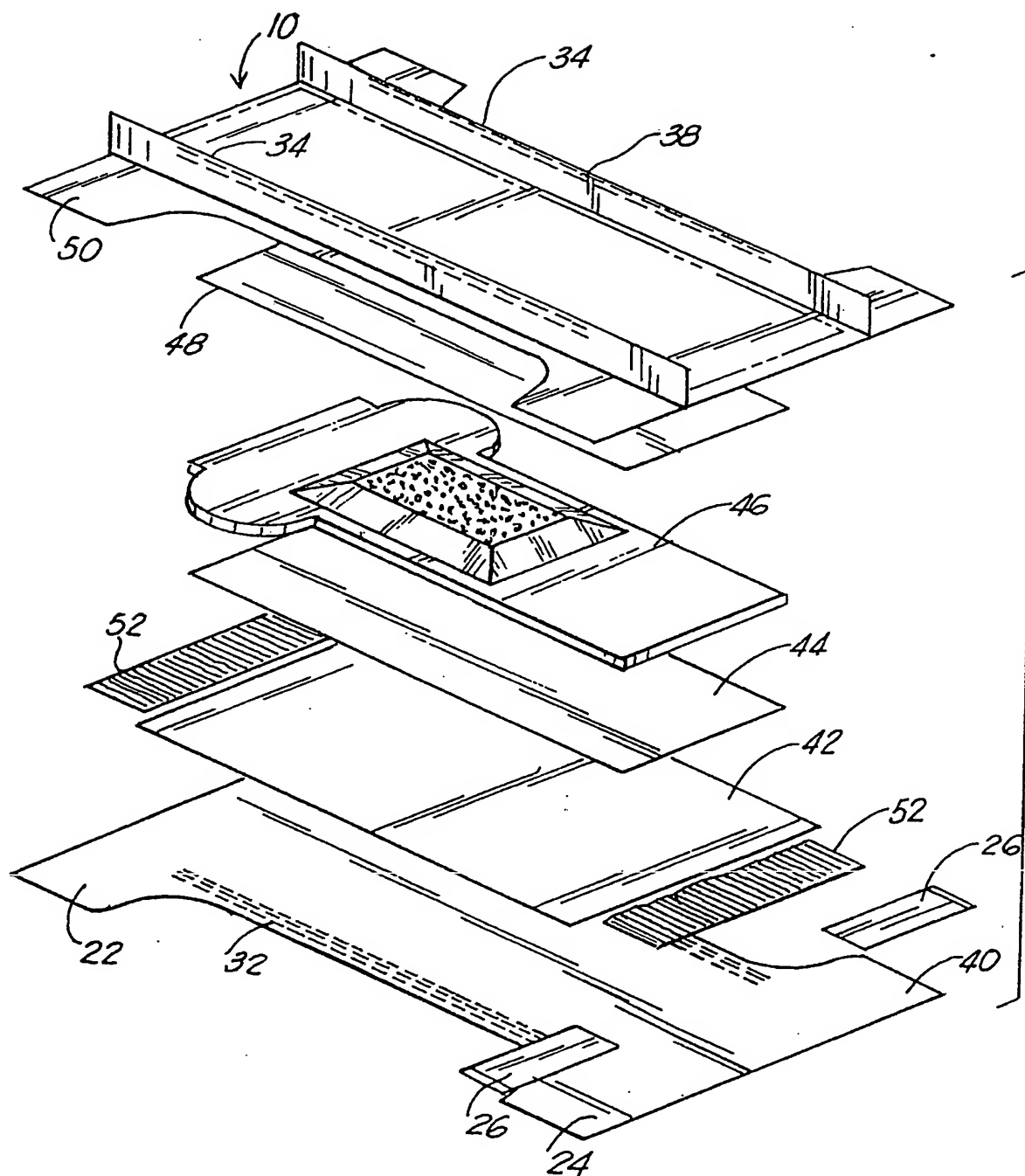


FIG. 3

SUBSTITUTE SHEET (RULE26)



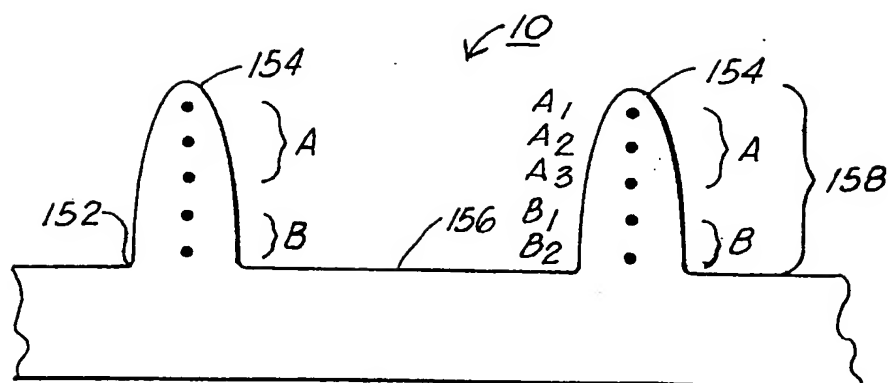


FIG. 5

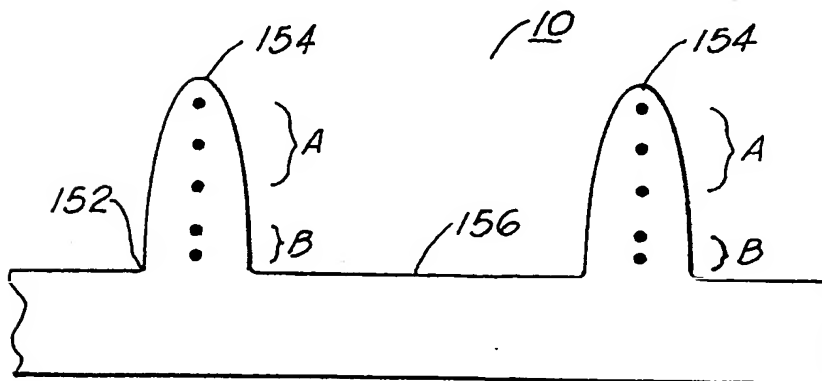


FIG. 6

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/15700

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A61F 13/15

US CL : 604/385.2

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 604/385.1, 385.2, 386, 387, 393-396

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,704,116 A (ENLOE) 03 November 1987, Figs. 3 and 4, col. 4 line 46 to col. 5 line 37, and claim 13.	1-5, 7, 8 ----- 6, 9, 10
Y	US 5,643,243 A (KLEMP) 01 July 1997, Figs. 3 and 4, and col. 4 lines 28-39.	6
Y	JP 04-371147 A (KITAOKA) 24 December 1992, figures, and page 8 first full paragraph of translation.	9, 10

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

02 SEPTEMBER 1999

Date of mailing of the international search report

29 OCT 1999

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